AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously presented) A traffic congestion control apparatus for use in a network having a plurality of types of data traffic, the data traffic comprising high priority traffic and low priority traffic, the network having a plurality of links through which the data traffic flows, each of the links being susceptible to data traffic congestion, the apparatus comprising:

a filter that filters the data traffic;

a sampler that samples a characteristic of the data traffic filtered by the filter, the characteristic of the data traffic indicating a present link capacity requirement of the filtered traffic; and

a flow control system that adjusts the transmission rate of the low priority traffic in response to the sampled characteristic.

2. (Previously presented) The traffic congestion control apparatus in accordance with claim 1, wherein the sampled characteristic is a low frequency bandwidth.

3. (Previously presented) The traffic congestion control apparatus in accordance with claim 2, wherein the network is an asynchronous transfer method (ATM) network.

4. (Previously presented) The traffic congestion control apparatus in accordance with claim 3, wherein the high priority data traffic comprises constant bit rate (CBR) traffic and variable bit rate (VBR) traffic, and the low priority traffic comprises available bit rate (ABR) traffic.

5. (Previously presented) The traffic congestion control apparatus in accordance with claim 1, further comprising a queue buffer which temporarily stores the data traffic before the data traffic flows through each of the links.

6. (Previously presented) The traffic congestion control apparatus in accordance with claim 5, wherein the queue buffer is a SRAM.

7. (Previously presented) The traffic congestion control apparatus in accordance with claim 1, in which the filter further comprises a low pass filter.

8. (Previously presented) The traffic congestion control apparatus in accordance with claim 1, in which the filter further comprises a digital signal processor.

9. (Previously presented) The traffic congestion control apparatus in accordance with claim 8, wherein the filtering operation comprises a multiple step moving average operation having a predetermined time step unit.

10. (Previously presented) The traffic congestion control apparatus in accordance with claim 1, wherein the filter filters only the high priority traffic.

11. (Previously presented) The traffic congestion control apparatus in accordance with claim 2, further comprising a controller that calculates an optimal low priority traffic flow rate based on the measured low frequency bandwidth of the filtered data traffic and a total link capacity, the controller indicating to the flow control system an amount to adjust the low priority data traffic flow based on the calculated optimal low priority traffic flow rate.

12. (Previously presented) The traffic congestion control apparatus in accordance with claim 11, wherein the controller further determines a round trip delay and accounts for the round trip delay in the calculation of the optimal low priority traffic flow rate.

13. (Previously presented) The traffic congestion control apparatus in accordance with claim 12, further comprising a plurality of flow control systems, each of the flow control systems being associated with each link, the controller indicating the optimal flow rate to each of the plurality of flow control systems.

14. (Previously presented) The traffic congestion control apparatus in accordance with claim 13, wherein each of the flow control systems controls a flow of a plurality of low priority inputs and the controller accounts for the number of inputs to each flow control system to determine the optimal flow rate for each flow control system.

15. (Previously presented) The traffic congestion control apparatus in accordance with claim 11, wherein the controller utilizes a Generated Prediction Control process to eliminate low frequency, high magnitude oscillations of the low priority traffic flow rate.

16. (Previously presented) A method for controlling congestion in a network having data traffic comprising high priority traffic and low priority traffic, the low priority traffic being transmitted by a plurality of data inputs, the network comprising a plurality of links through which the data traffic flows, the method comprising:

filtering the data traffic;

periodically sampling the filtered traffic to estimate a present link capacity required by the high priority traffic; and

adjusting a transmission flow rate of each data input to match a transmission rate that minimizes an unused link capacity of each link subject to no congestion.

17. (Previously presented) The method for controlling congestion in a network of claim 16, wherein the filtering comprises passing the data traffic through a low pass filter.

18. (Previously presented) The method for controlling congestion in a network of claim 17, wherein the sampling comprises measuring the low frequency bandwidth of the filtered traffic.

19. (Previously presented) The method for controlling congestion in a network of claim 16, wherein the filtered data traffic includes the high priority traffic.

20. (Previously presented) The traffic congestion control apparatus in accordance with claim 1, wherein the sampled characteristic is a low frequency bandwidth.

21. (New) A congestion control method for a high speed network comprising a plurality of network nodes, each node receiving network traffic comprising high priority traffic and low priority traffic, the method comprising:

determining a link capacity at each node by analyzing low frequency characteristics of the traffic; and

adjusting a transmission flow rate of low priority traffic based upon the determined link capacity.

22. (New) The method of claim 21, in which the network traffic comprises constant bit rate traffic, variable bit rate traffic, and available bit rate traffic.

23. (New) The method of claim 21, in which the network traffic comprises constant bit rate traffic, and variable bit rate traffic.

24. (New) The method of claim 21, in which the adjusting further comprises controlling a transmission rate of the low priority traffic to obtain a target high utilization of link capacity.

25. (New) The method of claim 24, in which the controlling further comprises controlling the low priority traffic using a generalized predictive control method.

26. (New) The method of claim 21, in which the determining further comprises determining an arrival rate of all traffic, and filtering the arrival rate of each channel in a low frequency band to obtain filtered arrival rates.

27. (New) The method of claim 26, further comprising comparing filtered arrival rates to a link speed of an input port of a node, and

determining the node is congested when a sum of the filtered arrival rates of the input port are greater than the link speed.

28. (New) The method of claim 26, in which the filtering comprises low pass filtering.

29. (New) A method for determining whether a high speed network is congested, comprising:

estimating a bandwidth requirement of data traffic in the network by low pass filtering the data traffic to obtain a filtered bandwidth rate;

comparing the filtered rate with a link capacity; and

determining congestion on the network occurs when the filtered rate is greater than the link capacity.

30. (New) The method of claim 29, in which the data traffic comprises constant bit rate traffic, variable bit rate traffic, and available bit rate traffic.

31. (New) The method of claim 29, in which the data traffic comprises constant bit rate traffic, and variable bit rate traffic.